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ABSTRACT

New roles for college institutional researchers in the area of data administration and management that have resulted from developments in computer technology are reviewed. These developments include easily accessed databases, user-friendly software, and powerful and inexpensive hardware. The growing demand for data, combined with a general lack of user concern for data management problems, have placed data administration and management responsibilities with the Office of Institutional Research and Planning (OIRP) at the University of Kansas. Three main reasons for the development of this role are identified: OIRP is a heavy user of university data for analytical and reporting purposes; OIRP is in a unique position to see the information needs and data uses of both university central administration and the more decentralized departments and units; and the position of OIRP within the university administrative structure makes it the ideal location for a data administration function. Five specific areas of data management are discussed: data access, data integrity, data manipulation, data analysis and interpretation, and data reporting. (SW)

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THE ROLE OF INSTITUTIONAL RESEARCH IN DATA ADMINISTRATION AND MANAGEMENT

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ABSTRACT

The dynamic growth of information technology, including easily accessed data bases, user-friendly software, and powerful, inexpensive hardware, has resulted in new roles and new responsibilities for institutional research in the area of data administration and management. An ever-increasing number and variety of users are finding access to data of prime importance. The growing demand for data, combined with a general lack of user concern for data management problems, has placed data administration and management responsibilities squarely on the shoulders of institutional research. This paper will focus on this emerging role, explore five specific areas of data management concern, and examine three crucial responsibilities for institutional research in this evolving area.

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Ann K. Dickey, Chair
Forum Publications Editorial
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THE ROLE OF INSTITUTIONAL RESEARCH IN DATA ADMINISTRATION AND MANAGEMENT

INTRODUCTION

Administrative use of the microcomputer has had a profound impact on university operations. In particular, administrative computing activities, once the sole responsibility of the central computing enterprise within an organization, are now widely dispersed throughout the organization. Powerful, easy to use desktop computers and user-friendly software have enabled professionals at virtually every operational level to participate in the collection, analysis and reporting of data. As "users" acquire needed data and request additional data, and as they become more proficient in manipulating that data, the more aggressive they become in data-related operations. It is these expanding roles, new capabilities and new expectations which have serious implications for effective data administration and management.

This paper first briefly describes the historic and the emerging "computer technology driven" data and information roles and needs of various organizational units. Next it discusses several key issues surrounding the decentralization of data: data access, data integrity, data manipulation, data analysis and interpretation, and data reporting. The last section of the paper focuses on the role of institutional research in the administration and management of data.

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HISTORIC ROLES

Administrative computing has been the traditional workhorse that develops and maintains the basic operating systems of an institution. The financial, personnel, student and facilities operations systems often are included in administrative computing responsibilities. These systems support the critical, ongoing processes of an organization.

Functional operations such as personnel, financial accounting, and admissions and records are primary users of administrative data designed to support their operating duties. Managers are concerned with the straightforward "stocks and flows" of the items for which they are responsible. Personnel counts people, the comptroller counts dollars, and admissions and records counts students.

Complementing these functional operations is institutional research, typically the principal analytical arm of the institution. The gathering, synthesizing, analyzing and reporting of data to support decision making is a major institutional research function. Institutional researchers are heavy users of administrative data in their roles of data interpreter and information purveyor. Central administration, academic schools and departments have been the principal recipients of operating and analytical data, which provide information and insight about how an organization has performed (dollars spent, students enrolled) and indicate implications for the future based on data trends.

EMERGING ROLES

With the introduction of the microcomputer, the lines which delineated the roles of providers and recipients of information have been blurred. Today, almost anyone with a minimum of microcomputing competence can assume the role of data generator, analyzer and/or reporter. Data from any source can be manipulated and adjusted to present "an accurate picture", or the "truth", however it may be defined. The explosive growth of data-related activities throughout higher education has driven home the realization that the days of casual use of data are gone forever. From the staff member in the smallest administrative department to the president of the institution, the "wild west" data use mentality is becoming, by necessity, more civilized.

Bias is an all too common factor in the data and information business, and an effort to limit bias and contradictory reporting through effective data management and administration is a critical, difficult task. It is important, however, not to confuse data management and administration with rigid control. Excessive data regulation both exceeds legal boundaries and is inappropriate in an institution of higher education. It is vital to have an effective data administration and management function in place as organizations make the transition from centrally controlled and manipulated data to an environment that demands decentralized data.

TRANSITION TO DATA ADMINISTRATION

As the data processing field grew, it was initially believed that a data base administrator (DBA) using a data base management system (DBMS) would solve many of the technical, administrative and procedural data processing problems. Specific problems included the collection, processing, integration, security, and dissemination of data and/or information. Initially it was envisioned that the DBA/DBMS combination would be the focal point for all matters concerning data and/or information. This proved not to be the case as the DBA became totally engulfed in the technical aspects of the DBMS, with little or no time for what is now considered data administration. Thus, in the mid-1970s there began to emerge the data administrator who initially assumed from the DBA the job of interfacing the DBMS with the application programmers, users, and executives (Barnett, 1982 DD).

Data base administration involves the technical and mechanical aspects of electronic data processing. The major concerns of data base administration include:

- mapping of data elements into records, and the records into an appropriate data structure;
- the establishment of an effective strategy for the physical placement of data;
- selection of one or more access methods/reference paths through the data base; and
- establishment of procedures to provide the necessary level of data security. integrity, and recovery (Uhrbach, 1980).

Data administration focuses on the analytical and not the technical aspects of data. The over-all goals of data administration are to facilitate the following:

- the access to and the understanding, reliability, accuracy, completeness, consistency, and "currency" of systems documentation;
- systems planning, development, and maintenance;
- the usage of DBMS and other software products;
- coordination in all matters relative to data resources, their organization, and their effectiveness and control (Barnett, 1982 DA).

Once again, the demand for decentralizing data has focused attention on the need to establish a data administration function to assure that users who obtain access to university data bases understand the content and anomolies of the data. It should be the goal of data administration to "enlighten" users to minimize the earlier reported concern of bias and contradictory reporting of data.

DECENTRALIZING DATA: FIVE AREAS OF CONCERN

Given that a primary concern of data administration is the decentralization of data, an organization must come to grips with a number of data issues, including data access, integrity, manipulation, analysis and interpretation, and reporting. Since institutional research has historically had a stake in these issues, this interest will also be discussed.

Data Access

Given the perception that knowledge is power, the issue of data access (knowledge access) is perhaps the most important and politically sensitive element of data administration. Questions of who is allowed what access to which data bases at what point in time cuts across all activities of an institution, including data about finances, students, and personnel, among others. The type and extent of problems engendered by the relatively simple question of data access are confounded by combining the desire for data with legal, data security and data validity concerns.

Unfortunately, there are no "correct" answers to these questions. The policies, practices and politics of an institution likely will dictate data access procedures. An administrator who has control of and responsibility for an official data base (also referred to as the system administrator) might be reluctant to provide open access to data for fear they will be misunderstood and misused. System administrators tend to be extremely sensitive about data that have implications for funding, accreditation, and program continuance, among others. Users of the information may have to prove themselves to be responsible and capable of understanding the intricacies and anomalies of the data in order to gain and retain access. On the other hand, a system administrator might view the expanded access as an opportunity to provide an increased level of data quality. Users who can see a direct link between the quality of information they provide for entry into a data base and the quality of the reports generated, are more conscientious in reporting and auditing data they provide.

Data Integrity

The concern about data integrity (data timeliness, accuracy, completeness and consistency) is widespread. Frequent users of data, whether the data are generated by a computer or by other tabulation procedures, soon develop expectations concerning the data. Data are expected to be timely: faculty expect rosters the first day of classes. Data are expected to be accurate: funding agencies expect accurate counts of students, particularly if funding is related to enrollment. Data are expected to be complete: summary information is expected at the department, school, and university levels. Additionally, data are expected to be consistent: enrollments at multicampus institutions reported by the individual campuses should agree, and detail and summary information should have the same total figures.

When data on an official university data base are updated regularly, frequent users of the data are aware of the update schedule and expect timely reports after the appropriate set of updates. Failure to perform as expected increases the demand by users for access to current data to meet their needs.

Finally, data integrity requires constant vigilance. It is important to test the reasonableness of the data regardless of whether the data are produced by routine or ad hoc procedures. The conscientious institutional researcher will scrutinize data routinely, and the importance of this habit needs to be conveyed to other users of the data.

Data Manipulation

If a data administration overview function does not formally

exist, an institutional research (IR) office that is a primary user of the data is likely to be the defacto data administrator. Although administrative computing personnel usually are responsible for the operation, maintenance and technical aspects of all administrative data bases, they are not often asked to examine the data in the same way an institutional researcher would. The IR professional who analyzes data over time must be aware of changes in the data over time. To properly manipulate data, questions to be answered include: Which departmental acronyms have been changed? Which departments have merged with other departments and no longer exist? When did departments change schools? Have changes occurred in the course drop/add policy? When were ACT or other test scores (or other data fields) loaded into the data base?

While administrative computer programmers develop expertise in the particular system for which they are responsible, institutional researchers need an extensive working knowledge of all administrative data systems. By "dabbling" in several systems, institutional research personnel have become knowledgable about many aspects (especially the contents) of the different systems. When they discover that data in certain fields are not reported or configured as they had expected, or that other fields are not updated until a certain point in time, this information impacts the analyses they perform. These bits and pieces of information about data should be collected and formally recorded for use by other users. Ideally, these "data about data" (called metadata) should be stored in a data element dictionary (DED). A well documented DED is key to successfully decentralizing data.

Data Analysis and Interpretation

If data are made available in a machine readable form to units outside of adminstrative computing or the office of the system administrator, then a consulting function is needed to assure that the data are being properly analyzed and interpreted. While this function could be placed in any of several offices, the institutional research office will provide a unique point of view. Because that office historically has answered questions by drawing upon many data bases, it can provide guidance about how to approach many problems. Perhaps the institutional research office has already researched that particular question and has a ready answer.

"Complexity" also impacts decentralized computing. Users who plan to do their own programming using fourth generation, user-friendly programming tools are also known as end users. First-time users of these tools should not be expected to provide accurate data when the "correct" answer requires looping through one or more segments of a hierarchical data base and/or omitting certain records based on derived fields. As the institutional research office consults with users of the data, they will discover what portions of the DED are not definitive and can then augment the DED accordingly.

Data Reporting

The correct interpretation of data requires an understanding of the algorithms and procedures used to generate the report which contains the data. Computer-generated reports require the same attention as manually prepared reports since "garbage in, garbage

out" remains as true today as when computers were invented. Routine auditing of reports is necessary to detect errors in logic. Such auditing may be a by-product of ad hoc analyses of data. Institutional research at KU has discovered logic and data errors through regular analyses of the university data bases.

Standard "snapshots" of administrative data bases that freeze computer records at key points in time facilitate the production and reporting of consistent results. For example, student records are routinely frozen as of the census date for counting students. This permits various analyses of the data using the same population.

However, it is distressing to users of computer-based data to discover that routine computer reports are refined "by hand" so that efforts to duplicate the results df these reports is impossible without assistance from the perpetrator of these refinements. For example, standard enrollment reports that are refined by hand by the registrar to reflect changes to the data before publication means that it will be impossible to match subsequent computer analyses of the data with published counts. These practices thwart users who attempt to tie their data analyses to official published reports. This is a thorny issue that will become more visible as the number of end users escalates.

ROLE OF DATA ADMINISTRATION IN INSTITUTIONAL RESEARCH

At the University of Kansas, the Office of Institutional Research and Planning (OIRP) has been assigned the major

responsibility for data administration. There are three principal reasons for the development of this role.

First, OIRP is a heavy user of university data for analytical and reporting purposes. For over a decade, OIRP computer programmers have extracted and analyzed data from every major computer data base at the University of Kansas. It is the office most familiar with the subtleties and shortcomings of the broad range of institutional data and data bases.

Second, OIRP is in a unique position to see the information needs and data uses of both University central administration and the more decentralized departments and units. From this perspective, institutional research can more objectively assess and design the procedures and protocols required to implement effective data administration.

Third, the position of OIRP within the University administrative structure, i.e., reporting to the University Director of Information Resources, and with professional staff well qualified to undertake these responsibilities, makes it the ideal location for a data administration function. It is important to note that this role is evolving, and not static. Future responsibilities will depend on current performance.

The flip side of why data administration has been assigned to institutional research at the University of Kansas is why it was not assigned to administrative computing. Foremost among these reasons is that in the past data administration responsibilities have always been subordinate to the technical demands of data ***base*** administration. Additional factors include the scarcity of programming resources and the recognition that institutional

research staff are sensitive to the qualitative aspects of data resulting from their "arm's length" examination of the data. Administrative programmers tend to fixate on the process of manipulating data and building systems whereas institutional researchers must be concerned with content as well as form. Data administration requires considerable management/coordination, particularly in its developmental stages, not the highly technical abilities of administrative programmers.

Data administration in institutional research holds both promise and problems. The separation of data administration from data base administration may result in nonlinked data element dictionaries that may then require more coordination and more work. Data administration can be time consuming and require considerable resources. Diligence is required to keep the function from getting lost in the day-to-day activities, a problem not unlike the one found when "data administration" was the responsibility of the data base administrator.

The "promise" of the assignment of data administration to institutional research includes, among others:

- placing institutional research in a stronger position in designing University-wide systems as a result of working more closely with users and developing an understanding of their needs;
- separating the gate keeper function (institutional research) from the "owner" (system administrator) provides users with a first line of appeal if system administrators deny access to users;

- assisting users in meeting their information needs by drawing upon experience to know if requested information currently exists or if data will need to be extracted; and
- understanding the needs of the users will provide institutional research an opportunity to configure data in new formats for broad-based distribution across campus--the "data hits of 1986"!

An administrative function performed by a research operation is a challenge. Every effort must be made to balance the needs of the institution and the needs of various users, to ensure that data and information are understood by users, and to see that the outcomes of data use make sense. Because institutional research does not own operational data bases but uses them extensively, it has a vested interest in maintaining the information flow from, access to, and the integrity of these data bases. Since institutional research strives for institutional information to be reported on a consistent basis, it is crucial that other departments accessing computer-based information be knowledgeable about data in order to accurately report data.

Given this scenario, the role of institutional research in data administration is an evolutionary one with diverse and somewhat contradictory elements. For example, while data integrity must be more closely monitored to ensure accuracy, it is appropriate that institutional research facilitate broad-based use of, and access to, data. This "tight-loose" situation potentially can lead to administrative and management problems. While some users may require close monitoring to prevent "data

abuse", other less experienced but interested users may need to be coaxed to take the first wade in the water. In both cases, the demands on institutional research will be significant, but effort will be expended in different directions. Clearly, the role of institutional research in data administration is likely to be as political as managerial.

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